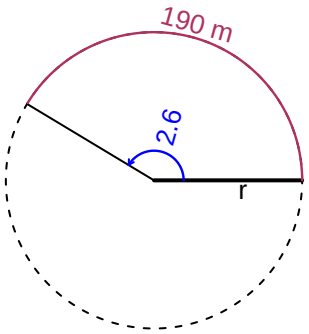
Name: Date:

Trig Final (SLTN v679)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 2.6 radians. The arc length is 190 meters. How long is the radius in meters?

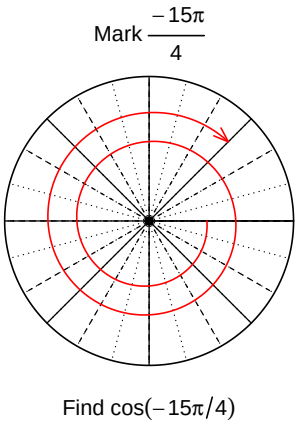


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

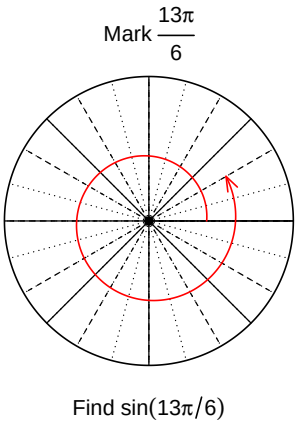
$r = 73.08$ meters.

Question 2

Consider angles $\frac{-15\pi}{4}$ and $\frac{13\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-15\pi}{4}\right)$ and $\sin\left(\frac{13\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(-15\pi/4)$



Find $\sin(13\pi/6)$

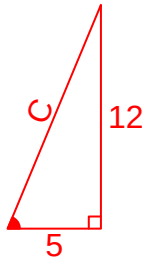
$\cos(-15\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(13\pi/6) = \frac{1}{2}$

Question 3

If $\tan(\theta) = \frac{-12}{5}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

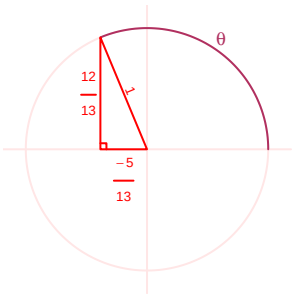
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$5^2 + 12^2 = C^2$$
$$C = \sqrt{5^2 + 12^2}$$
$$C = 13$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-5}{13}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 3.9 Hz, an amplitude of 5.28 meters, and a midline at $y = -2.58$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 5.28\sin(2\pi 3.9t) - 2.58$$

or

$$y = 5.28\sin(7.8\pi t) - 2.58$$

or

$$y = 5.28\sin(24.5t) - 2.58$$